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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/619,556	07/16/2003	Greg Parker	553-74	5931
23117	7590	03/09/2005	EXAMINER	
NIXON & VANDERHYE, PC 1100 N GLEBE ROAD 8TH FLOOR ARLINGTON, VA 22201-4714			PAK, SUNG H	
			ART UNIT	PAPER NUMBER
			2874	

DATE MAILED: 03/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/619,556

Applicant(s)

PARKER ET AL.

Examiner

Sung H. Pak

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-33 is/are rejected.
- 7) ☒ Claim(s) 19 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 0703.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Specification

Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a **single paragraph** on a separate sheet within the range of 50 to 150 words. It is important that the abstract **not exceed** 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

The abstract of the disclosure is objected to because it is more than a single paragraph and exceeds 150 words. Correction is required. See MPEP § 608.01(b).

Claim Objections

Claim 19 is objected to because of the following informalities: claim 19 ends in two periods. Appropriate correction is required.

Claim Rejections - 35 USC § 102

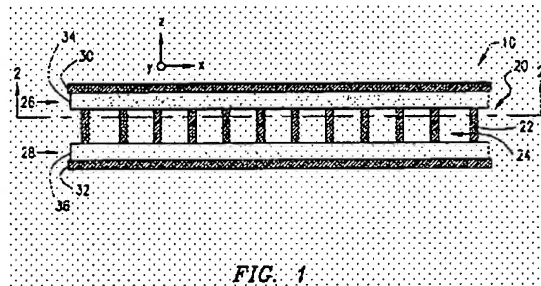
The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

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Claims 1-2, 5-6, 8-15, 19-20, 22-24, 26-28, 30-32 are rejected under 35 U.S.C. 102(e) as being anticipated by Sigalas et al (US 6,560,006).



Sigalas discloses an optical device with all the limitations set forth in the claims, including: a photonic crystal waveguide comprising a core layer (composed of air slab body and rods- column 4 lines 17-25; '20' Fig. 1) having a first refractive index n_{core} (the effective refractive index of the core layer is determined by the refractive index of air slab body and the refractive index of dielectric rods); array of sub-regions within the core layer having a second refractive index n_{rods} ('22' Fig. 1); wherein the sub-regions are formed from silicon (column 4 lines 19-20), and the sub-region gives rise to a photonic bandgap (column 1 lines 14-25). Since the core layer is composed of air slab body (which has a refractive index of 1) and silicon rods (which have refractive indexes of 3-4, column 6 line 3), n_{rods} is necessarily greater than the effective refractive index of the entire core layer n_{core} by at least 0.1.

Sigalas also discloses the waveguide structure being a planar waveguide structure (Fig. 1); the core layer being formed between a cladding layer (i.e. upper cladding '26' Fig. 1) and a buffer layer (i.e. lower cladding '28' Fig. 1); wherein the refractive indexes of the cladding and the buffer layers are less than n_{core} (column 6 lines 8-12); wherein the cladding layer is formed from silicon dioxide (column 4 line 53); wherein the array of sub-regions are arranged in a square lattice (Fig. 2); wherein the core layer includes a waveguiding region having no sub-

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regions, and wherein the waveguiding region includes a bend (Fig. 4); wherein the sub-regions extend through the cladding layer and into the buffer layer (Fig. 10g, '105'-cladding layer, '103 + 112'-buffer layer; column 7 lines 50-51). Since the sub-region in the cladding layer is composed of cladding layer material, its refractive index is the same as the cladding layer which is less than the refractive index of the core layer.

Claim 16 is rejected under 35 U.S.C. 102(e) as being anticipated by Takada (US 2001/0033409 A1).

Takada discloses a method of manufacturing an optical waveguide structure with all the limitations set forth in the claims, including: providing a core layer ('30' Fig. 2) having a first refractive index n_{core} (paragraph 0015); forming an array of holes in the core layer (Fig. 3d); filling the holes with a material having a second refractive index n_{rods} , wherein n_{rods} is greater than n_{core} (paragraph 0015).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any

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evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takada (US 2001/0033409 A1) in view of Sigalas et al (US 6,560,006).

Takada discloses a method of manufacturing optical waveguide structure as discussed above. In addition, Takada discloses a method of providing a cladding layer having a refractive index less than the core layer (paragraph 0039). However Takada does not teach the step of providing a buffer layer on the other side of the waveguide layer.

Sigalas, on the other hand, teaches a step of providing a buffer layer (i.e. lower cladding) having a refractive index less than the waveguiding core layer as discussed above (column 6 lines 8-12). Such a step is desirable and advantageous over the prior art because it efficiently provides vertical light confinement, such that the traveling signal light is confined to the waveguiding layer, instead of leaking out of the structure.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the Takada device to have a buffer layer disposed on the other side of the waveguiding core layer.

Claims 3-4, 21, 25, 29, 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sigalas et al (US 6,560,006) in view of Koops et al (US 6,075,915).

Sigalas discloses an optical waveguide structure having a cladding refractive index less than the refractive index of sub-regions and the core layer as discussed above, except it does not teach that the waveguide structure is an optical fiber having a planarized cladding layer.

Koops on the other hand, teaches the photonic crystal waveguide structure formed as an optical fiber having a planarized cladding layer (Fig. 1). This arrangement is advantageous and desirable over the prior art, because it allows for production of small and compact optical processing device to be fully integrated with the optical transmission fiber (column 2 lines 3-12).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the Sigalas device to have the waveguide structure in an optical fiber.

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takada (US 2001/0033409 A1) in view of Koops et al (US 6,075,915).

Takada discloses a method of manufacturing optical waveguide structure as discussed above. However, it does not teach the step of forming the waveguide structure as an optical fiber.

Koops on the other hand, teaches the photonic crystal waveguide structure formed as an optical fiber having a planarized cladding layer (Fig. 1). This arrangement is advantageous and desirable over the prior art, because it allows for production of small and compact optical processing device to be fully integrated with the optical transmission fiber (column 2 lines 3-12).

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Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the Takada device to have the waveguide structure in an optical fiber.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sigalas et al (US 6,560,006) in view of Cotteverte et al (US 2002/0048422 A1).

Sigalas discloses an optical waveguide structure as discussed above. Although Sigalas discloses that the slab body may comprise other dielectric materials instead of air (column 4 lines 28-30), it does not explicitly teach the use of doped silica for waveguiding layer.

Cotteverte discloses a photonic crystal waveguide having a doped silica waveguiding layer with columnar photonic bandgap elements (paragraph 0062). The use of doped silica for waveguiding layer is considered advantageous and desirable in the art because it allows for a low loss optical transmission element capable of refractive index adjustment, which simplifies manufacturing process and lowers costs.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the Sigalas device to have doped silica for its waveguiding layer.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Meade et al (US005526449A), Kurosawa (US006134369A), Loncar et al (US

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20020150366A1), and Sugitatsu et al (US 20040062505A1) disclose photonic crystal waveguide structures.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sung H. Pak whose telephone number is (571) 272-2353. The examiner can normally be reached on Monday - Thursday : 6:30am- 5:00pm.

The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Sung H. Pak
Examiner
Art Unit 2874

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